

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: BE03000161

Date: 19/06/2026

Subject Name: NETWORK THEORY

Time: 02:30 PM TO 05:00 PM

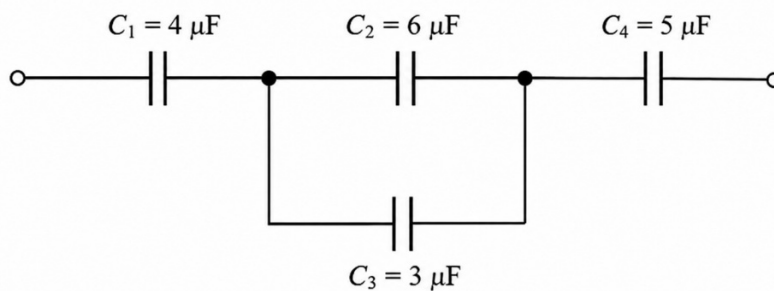
Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

Q.1 (a) Find the equivalent capacitance for the circuit shown below

03



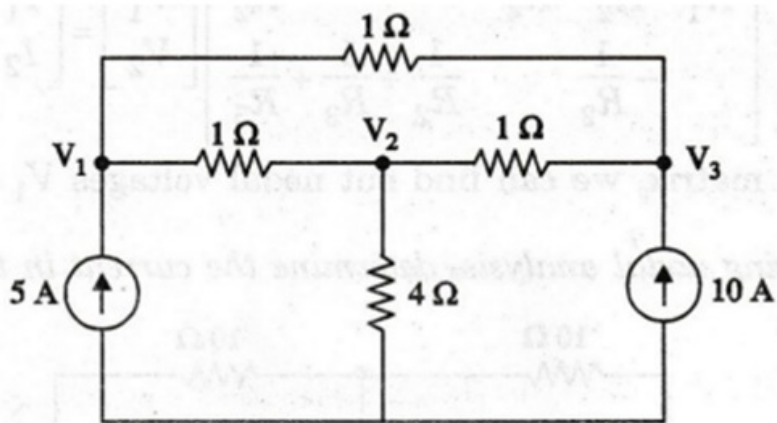
(b) Explain the following electrical network elements with suitable examples:

04

- (i) Linear and Non-Linear elements
- (ii) Bilateral and Unilateral elements
- (iii) Active and Passive elements
- (iv) Lumped and Distributed Networks.

(c) Find V_1 , V_2 , V_3 by the nodal method for the given circuit.

07



Q.2 (a) Discuss the rules and limitations of source transformation in network simplification.

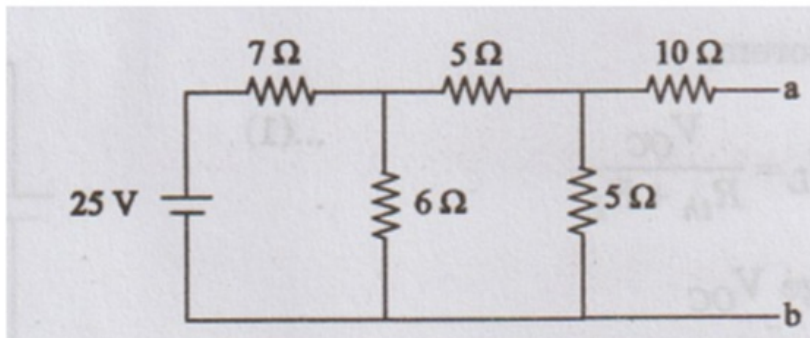
03

(b) State and explain maximum power transfer theorem.

04

- (c) Find the Thevenin's voltage and Thevenin's resistance for the circuit of given below across terminal-ab

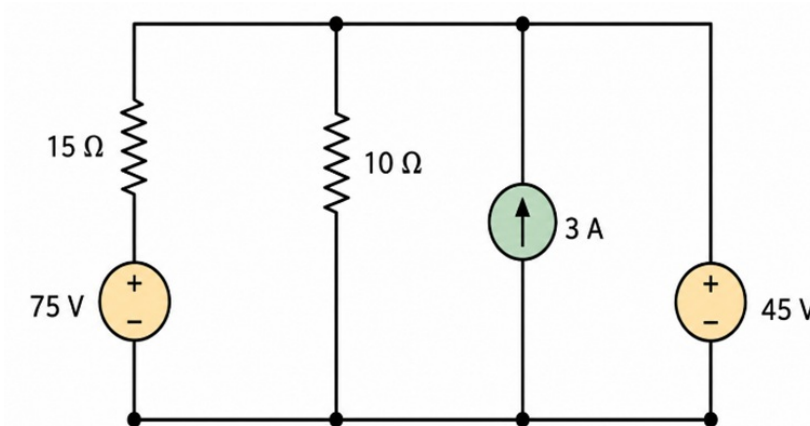
07



OR

- Q.2 (c) Find current through 15 ohm resistance in the circuit shown in figure using superposition theorem.

07



- Q.3 (a) Differentiate between transient response and steady-state response.
 (b) Give statements for Reciprocity Theorem and Compensation Theorem
 (c) State and explain Millman's Theorem with its applications in circuit analysis.

03

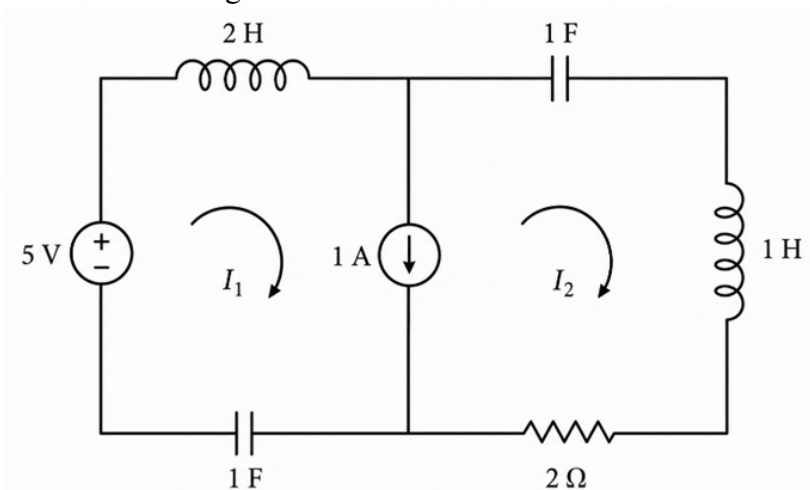
04

07

OR

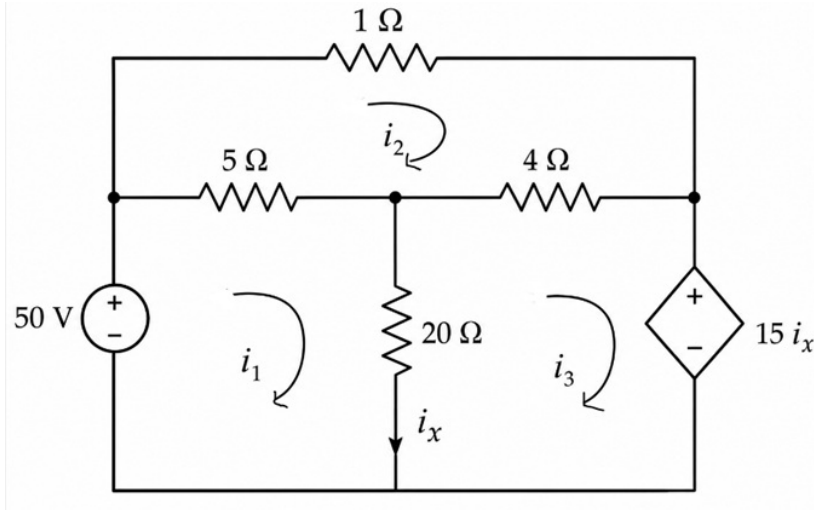
- Q.3 (a) Draw dual of the given network.

03



(b) Explain the initial and final conditions of capacitors and inductors with the help of appropriate equivalent circuits. 04

(c) Find the value of mesh currents in the circuit shown below. 07



Q.4 (a) Find the value of $L \{t \cos bt\}$. 03

(b) The incidence matrix of a graph is given below: 04

$$A = \begin{bmatrix} -1 & 0 & 1 & 1 & -1 & 0 \\ 1 & -1 & 0 & 0 & 0 & -1 \\ 0 & 1 & -1 & -1 & 1 & 1 \end{bmatrix}$$

i) Draw the graph

ii) How many trees are possible?

iii) Write the reduced incidence matrix

(c) Analyse the transient response of a first-order RL or RC circuit and illustrate it with a suitable example. 07

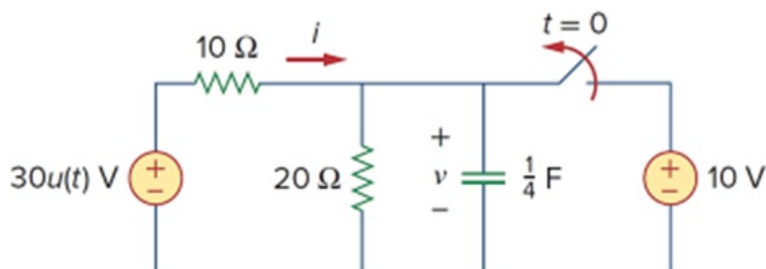
OR

Q.4 (a) Define time constant and state its importance in circuit analysis. 03

(b) Find the inverse Laplace transform of the function 04

$$F(s) = \log \frac{s+3}{s+4}$$

(c) Find i and v if the switch is opened at $t = 0$ after keeping it closed for a long time. 07



Q.5 (a) Explain the concept of PRF. 03

(b) Define the following terms: 04

(i) Planner graph

(ii) Incident Matrix

(iii) Tie-set matrix

(iv) Sub-graph

- (c) Discuss the interrelationship between Z-parameters and Y-parameters and derive the required expressions for a two-port network. 07

OR

- Q.5 (a) List down the properties of Hurwitz polynomial. 03
- (b) Derive and explain the transformation of Y-parameters into Z-parameters for a two-port network. 04
- (c) Calculate the h-parameters of the given two-port network. 07

